

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1 – 120. (CANCELED)

121. (NEW) A method of treating and drying a substrate, the method comprising the steps of:

- (a) providing a chamber proportioned to process at least one substrate, the chamber including a lower portion and an upper portion;
- (b) exposing at least one substrate to a process fluid in the lower portion of the chamber;
- (c) directing megasonic energy into the process fluid,
- (d) forming an atmosphere of drying vapor in an upper region in the chamber;
- (e) during step (c), withdrawing the substrate from the process fluid in a lower region of the chamber into the upper region of the chamber.

122. (NEW) The method of claim 121, wherein step (c) forms a band of megasonic energy propagating towards a surface of the substrate, wherein the withdrawing step causes the substrate to pass through the band, and wherein the megasonic energy induces thinning of a boundary layer on the portion of the substrate passing through the band.

123. (NEW) The method of claim 122, wherein the withdrawing step is performed at a rate of approximately 8 – 20 mm/sec.

124. (NEW) The method of claim 123, wherein the megasonic energy is propagated in a direction normal to the substrate surface.

125. (NEW) The method of claim 123, wherein the megasonic energy is propagated at an angle that is less than normal to the substrate surface.

126. (NEW) The method of claim 121, further including, after step (e), introducing a heated gas into the chamber to evaporate condensed drying vapor from the surface of the substrate.

127. (NEW) The method of claim 126, wherein the heated gas is introduced through one or more inlets into the chamber, and wherein the method further includes translating the substrate past the inlets to accelerate evaporation.

128. (NEW) The method of claim 121, wherein step (b) includes exposing only one substrate to a process fluid in the lower portion of the chamber.

129. (NEW) The method of claim 121, wherein the process fluid includes deionized water.

130. (NEW) The method of claim 121, wherein the drying vapor includes isopropyl alcohol vapor.

131. (NEW) The method of claim 121, wherein the atmosphere of drying vapor includes nitrogen gas.

132. (NEW) The method of claim 126, wherein the gas is nitrogen gas.

133. (NEW) The method of claim 121, wherein the megasonic energy induces thinning of a boundary layer on the substrate.

134. (NEW) An apparatus for treating and drying a substrate, the apparatus comprising:

a chamber proportioned to process at least one substrate, the chamber including a lower portion and an upper portion;

a source of a process fluid fluidly coupled to the lower portion of the chamber;

a source of drying vapor fluidly coupled to an upper portion of the chamber, to create an atmosphere of drying vapor in the upper portion;

an end effector having a substrate-receiving member moveable between the lower portion of the chamber and the upper portion of the chamber, said end effector operable to withdraw a substrate from process fluid in the lower portion into the atmosphere of drying vapor in the upper portion; and

a megasonic transducer positioned to direct megasonic energy into process fluid in the chamber.

135. (NEW) The apparatus of claim 134, wherein the transducer is positioned to form a band of megasonic energy propagating towards a surface of the substrate, wherein the end effector is positioned to move the substrate through the band, and wherein the megasonic energy induces thinning of a boundary layer on the portion of the substrate passing through the band.

136. (NEW) The apparatus of claim 134, wherein the end effector is configured to withdraw the substrate through the band at a rate of approximately 8 – 20 mm/sec.

137. (NEW) The apparatus of claim 134, wherein the megasonic transducer is oriented to propagate energy in a direction normal to the substrate surface.

138. (NEW) The method of claim 134, wherein the megasonic transducer is oriented to propagate energy at an angle that is less than normal to the substrate surface.

139. (NEW) The apparatus of claim 134, further including a source of heated gas fluidly coupled to the chamber to volatilize condensed drying vapor from a surface of a substrate.

140. (NEW) The apparatus of claim 139, further including one or more inlets in the chamber for introduction of the heated gas into the chamber, and an end effector having a substrate-receiving portion moveable to translate a substrate past the inlets to accelerate evaporation.

141. (NEW) The apparatus of claim 134, wherein the drying vapor includes isopropyl alcohol.

142. (NEW) The apparatus of claim 134, wherein the apparatus includes a system, the chamber forming a part of the system, and wherein the apparatus further includes means for exhausting drying vapor from the system.

143. (NEW) The apparatus of claim 134, wherein the process fluid includes deionized water.

144. (NEW) The apparatus of claim 134, wherein the chamber is proportioned to process only one substrate at a time.

145. (NEW) The apparatus of claim 134, wherein the transducer is positioned such that megasonic energy induces thinning of a boundary layer on the substrate as the substrate is moved from the process fluid into the atmosphere of drying vapor